

REMARKS

Claims 1, 3-9 and 11-12 are presently pending in the application. Claims 6-9 and 11-12 remain withdrawn from consideration, as directed to non-elected species.

Claim 1 has been amended to positively recite more specific steps in the inventive method for fabricating the probe. Steps (a) – (g) are described in the specification at least in paragraphs [0030] – [0036] and Fig. 2; steps (h) – (j) are described in the specification at least in paragraphs [0037] – [0042] and Fig. 3, and steps (k) – (o) are described in the specification at least in paragraphs [0043] – [0048] and Fig. 4. Further, claims 4, 6, and 7 have been amended to more accurately identify each step which is described. No new matter has been added by these amendments, and entry is respectfully requested.

Applicants again acknowledge and appreciate the Examiner's indication in the first Office Action that claim 1 is generic to all of the claims. Accordingly, since it is respectfully submitted that claim 1 is allowable for the reasons set forth below, the Examiner is respectfully requested to rejoin all of the pending claims in the application.

In the present Office Action, the Examiner has again rejected claims 1, 3 and 11-12 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,386,720 of Toda et al. ("Toda"). The Examiner has also again rejected claims 4 and 5 under 35 U.S.C. §103(a) as being unpatentable over Toda in view of U.S. Patent No. 4,581,101 of Senoue et al. ("Senoue"). Applicants respectfully traverse these rejections and the arguments in support thereof for the reasons set forth previously on the record, which Applicants rely upon in full, and for the additional reasons which follow, and respectfully request reconsideration and withdrawal of the rejections.

Rejection Under § 102(b) Based on Toda

Regarding claims 1, 3 and 11-12, the Examiner maintains that Toda teaches a method of fabricating a probe including a cantilever, a body supporting the cantilever, and a tip formed at an end of the cantilever. The Examiner contends, referring in particular to Figs. 3A, B, and H-J, that the method of Toda includes all of the claimed steps. Toda allegedly also teaches that the silicon substrate has a <110> directional crystal structure and that the mask layers are composed

of silicon dioxide (col. 5, line 49 to col. 6, line 24). The Examiner argues, relying on U.S. Patent No. 5,021,364 of Akamine, that the boron diffused layer inherently serves as an etch stop layer in an anisotropic etch process.

In response to Applicants' previous arguments that Toda does not teach a silicon substrate having $\langle 110 \rangle$ directional crystal structure, the Examiner argues that Toda teaches in col. 6, lines 11-13 that "at this time, the resist has the patterning shape extending in the $\langle 110 \rangle$ direction of the silicon wafer as shown in Fig. 3E." Therefore, the Examiner maintains that Toda indeed teaches a silicon wafer substrate having $\langle 110 \rangle$ directional crystal structure as claimed.

As previously explained, the present invention is directed to a straightforward, low cost method of fabricating a probe using a silicon substrate with $\langle 110 \rangle$ directional crystal structure as a starting material. Using such a method, which involves anisotropically etching the silicon substrate, a probe exhibiting excellent performance can be easily fabricated without a complicated double side alignment process. Rather, when a silicon substrate having $\langle 110 \rangle$ directional crystal structure is used as a starting wafer, a double side alignment process for forming a cantilever is not necessary because the silicon substrate is etched in a vertical direction from the substrate (see paragraphs [0047], [0051], and [0055] of the present application). That is, as shown in Fig. 4D, the etched surface is perpendicular to the surface of the substrate because of the special characteristics of the $\langle 110 \rangle$ wafer. These characteristics enable the anisotropic etching process without the double side alignment process which is essential when utilizing a $\langle 100 \rangle$ wafer.

Applicants maintain that, despite the Examiner's continued assertions to the contrary, Toda does not teach or suggest a substrate having $\langle 110 \rangle$ directional crystal structure. Rather, Toda's reference to the $\langle 110 \rangle$ direction is merely a way to describe the direction of the patterning shape of the resist, and does not refer to the directional crystal structure of the silicon substrate.

Claim 1 has been amended to more accurately recite the steps which are performed in the simple, straightforward method of the invention which produces a probe with excellent performance. Toda does not teach or suggest the claimed steps, including providing a silicon substrate having $\langle 110 \rangle$ directional crystal structure as a starting wafer (step (a)), using remaining photoresist as a mask (steps (d) and (m)), or using a mask layer as a mask (steps (f), (i), and (o)). Accordingly, Toda does not teach or suggest all of the claimed elements, and thus

does not anticipate the present claims. Reconsideration and withdrawal of the § 102(b) rejection based on Toda are respectfully requested.

Rejection Under § 103(a) Based on Toda in view of Senoue

Regarding claims 4 and 5, the Examiner acknowledges that Toda does not teach the step of etching using SF₆, He and O₂ gases. However, Senoue allegedly teaches a dry etch process which utilizes these gases, and that variation of gas ratio causes polymer formation. The Examiner argues that Senoue teaches that the formation of polymer residue at a tip diminishes the sharpness of the tip. Accordingly, the Examiner concludes that absent any criticality to the claimed etching process and given that SF₆, He and O₂ gases are disclosed in Senoue, it would have been obvious to one having ordinary skill in the art at the time of the invention to utilize these gases in a reactive ion etching process based on the teachings of Senoue. Applicants respectfully traverse this rejection as follows.

As previously explained, Toda does not teach or suggest all of the elements of claim 1, such as the claimed steps of providing a silicon substrate having <110> directional crystal structure, using a remaining photoresist as a mask, and using a mask layer as a mask. Senoue does not cure these deficiencies as follows. First, Senoue does not teach or suggest a silicon substrate having a <110> directional crystal structure, but rather teaches a dry-etching process using dry-etching treatment of a semiconductor material by action of a gas. Senoue is thus silent as to directional crystal structure. Second, Senoue also does not teach the claimed steps for forming a probe. Thus, even the proposed combination of Toda with Senoue would not teach or suggest all of the claimed elements. Accordingly, claims 4 and 5 are allowable for at least the same reasons as claim 1, and reconsideration and withdrawal of the §103(a) rejection based on Toda in view of Senoue are respectfully requested.

In view of the preceding Amendments and Remarks, it is respectfully submitted that all of the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

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Respectfully submitted,

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(Date)

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Enclosure - Petition for Extension of Time (two months)